

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 20.

August, 1918.

No. 236

A PLEA FOR AUREOLARIA.

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AMERICAN botanists owe a debt of gratitude to Dr. S. F. Blake for his verification of many types of the species published by early workers in our field, results presented in the scholarly series of papers which has been appearing in RHODORA. In the current volume, page 66, is given the identity of *Rhinanthus virginicus* L. I am glad to accept the correction proposed, and, with Dr. Blake, wonder by what chance Pursh confused this species with his own "new" *Gerardia quercifolia*.

I cannot agree with Dr. Blake as to his application of the name *Gerardia flava* L. Linné gives citations — referring to Gronovius it is true — but after these he presents, as was his custom with species more carefully studied, a diagnosis. We know from B. D. Jackson's Index to the Linnean Herbarium that in 1753 Linné had in his herbarium a specimen, and from various determinations, acceded to by Dr. Blake, this is the glaucous species. The diagnosis favors this. The leaves are described as "basi incisapinnatim sinubus patulis," phrases usually too strong for the pubescent, but excellently describing the glaucous species. Moreover in the pubescent plant the flowers are very shortly and stiffly pediceled, so that the "spica" is scarcely to be characterized as "laxa."¹ To apply a Linnean name to a citation, in defiance of an extant specimen and a diagnosis apparently based upon this, is surely not warranted.

But it is to plead for the segregation of "Gerardia," or as I am pleased to note Dr. Blake agrees to term it *Agalinis*, that this paper is

¹ Or if *laza* signifies a "spica" more broken, the advantage is still with the glaucous species.

written. Dr. Blake discusses my separation of *Aureolaria* and *Agalinis*, confining his remarks however to the provisional key given by me in considering only the species of the Atlantic Coastal Plain.¹ That he so confines his discussion cannot but leave some doubt as to the intimacy of his acquaintance with the plants of this group.

To those who seek to express species-relationship no fact becomes plainer than that each group must be viewed in the totality of its characters. To found a group upon a single character is unfortunate. Also to conclude, as has been reasoned, that because in one alliance a character is of little or great value, therefore it is valueless or of exceeding value in some other alliance, is logic often disproved. Characters, such as color, frequently of trifling worth, are in some groups of great racial importance. Moreover, while we would like to standardize Nature, by the conditions of Evolution we cannot make our genera truly co-ordinate. *Aureolaria* and *Agalinis*, separated, possibly have not the value, that is distinctness, of *Pedicularis*, but the facts I shall present I think show conclusively that they have far more distinctness than has any possible combination of these, together, or with other allies.

My key, referred to, distinguished these as follows:

- "Corolla yellow. Anther-sacs parallel, awned at base. Capsule acute to acuminate. Seeds wingless or winged.....3. *Aureolaria*
 "Corolla pink or purple. Anther-sacs more or less divergent, obtuse to mucronate-awned at base. Capsule rounded at apex. Seeds wingless. 4. *Agalinis*"

To these characters might be added:

Aureolaria.— Parasitic on roots of trees, each species restricted to one or few allied hosts, usually species of *Quercus*. Stems relatively stout. Leaves lanceolate to ovate, entire to bipinnatifid-lobed, relatively large.

Agalinis.— Parasitic on roots of herbaceous plants, rarely on shrubs or trees, each species on many diverse hosts (excepting in *A. linifolia* (Nutt.) Britton). Stems slender. Leaves linear-lanceolate to filiform or subulate, entire (except that toothing sometimes occurs in *A. heterophylla* (Nutt.) Small).

Of course these are vegetative characters, but they are characters in correlation with those of flowers and fruit. Let us consider these latter characters, those presented in the key above.

First, color of corolla.² *Aureolaria* possesses large corollas, in some

¹ Bull. Torr. Bot. Club 40: 404. 1913.

² It may perhaps appear hazardous to discuss a character so perishable as color. But of the 48 species of *Aureolaria*, *Agalinis* and *Otophylla* of the United States I have collected and made descriptions of the fresh corollas of 43. The remaining 5 are closely akin to species seen.

species with irregularly distributed red-purple markings within. *Agalinis* possesses usually smaller thinner corollas, rose-pink to pink (not purple as previously stated), normally within on the anterior side marked with two longitudinal yellow lines to the antero-lateral sinuses, between which lines are almost always red-purple spots. The few cases where either lines or spots are lost seem evidently due to suppression. Possible exception must be made of the aberrant *A. linifolia*, in which, while spotting is present, the lines are absent. This species is too isolated for the student to risk the assumption that lining was ever present.

Second, anther-sacs. The anther-sacs of two of the three subgenera into which I would divide *Aureolaria* bear strongly developed horn-like awns. These are almost always somewhat curved. In spite of Dr. Blake's figure I can see little in common — except evolutionary origin — between these and the delicate semi-awning of *Agalinis*. In *Agalinis* there is every gradation between anthers rounded and anthers seemingly awned, but the latter state is ever an indeterminate attenuation and fusing, sometimes with slight hardening, of the lips of the orifice.¹ A far stronger case for his argument would be the condition found in my proposed third subgenus of *Aureolaria*, that which includes only the Mexican species, *A. Greggii* (S. Wats.).² In this the anther-sacs are quite awnless. But in other essential features this is an *Aureolaria*, nor does it seem surprising — and certainly no evidence of close kinship — that a primitive awnless state should be retained both here and in *Agalinis*. *A. Greggii* stands in some other features apart from typical *Aureolaria*, as does the equally aberrant *Agalinis linifolia* from others of that genus.

Third, capsule-shape. The distinction in this is constant, but the key-phrase for *Agalinis* should read "rounded with a mucro."

Fourth, seeds. In two subgenera of *Aureolaria* the seeds are

¹ Also the awning is always minute, I have seen no specimen showing this "precisely intermediate" with *Aureolaria*. *Agalinis peduncularis* (Benth.) Pennell, comb. nov. (*Gerardia peduncularis* Benth. in Hook. Comp. Bot. Mag. 1: 209. 1835-6) seems a singularly unfortunate species to have been selected as intermediate, inasmuch as in this the anther-sacs vary from awnless to minutely awned, or as I would express it, from "acuminate to cuspidate." The awns of *Aureolaria grandiflora* (Benth.) Pennell, comb. nov. (*Gerardia grandiflora* Benth., l. c. 206), it is true, are short for that genus, but they are stout and slightly decurved, resembling minute horns.

² *Aureolaria Greggii* (S. Wats.) Pennell, comb. nov.—*Gerardia Greggii* S. Wats. in Proc. Amer. Acad. 18: 131. 1883.

winged, but they are wingless in *Panctenis*, *A. pedicularia* (L.) Raf. and *A. pectinata* (Nutt.) Pennell. But for proving kinship such lack of winging is negative. Moreover the seeds of *Panctenis* and of *Agalinis* are readily distinguishable; in *Panctenis* they are plumper and the reticulations of the seed-coat are slightly raised giving a surface roughened, minutely honeycombed; in *Agalinis* the thinner usually more angular seeds are practically smooth.

Such is the correlation, not absolute, of characters by which to distinguish *Aureolaria* and *Agalinis*. Less may be urged for *Otophylla*. But certain features appear. Most important, I believe, is the reduction of the anthers of the posterior pair of stamens. Correlated with this we find: stem retrorse-hispid (not ascending-scabrous to glabrous as in *Agalinis*); leaves broader, lanceolate to ovate, in one species usually incised at base, in the other bipinnatifid; pedicels shorter, so that flowers are nearly sessile; corolla (as in *Agalinis linifolia*) with no trace of yellow lines within; and seeds honeycombed.

Now let us hold these three natural groups in one genus and attempt to find characters by which to distinguish the whole from allied genera. Allies are found in South America, and especially in Africa and Asia.

(A) The open-throated corolla is satisfactory for our flora but cannot be used as against *Sopubia*, *Graderia*, etc. Moreover it is not constant within "Gerardia," for in one section of *Agalinis* the corolla is progressively modified through stages present in various species¹ into the flattened "two-lipped" corollas of *A. divaricata* (Chapm.) Pennell and *A. filicaulis* (Benth.) Pennell.

(B) Equivalence of anther-sacs. In most of the allied genera we find a reduction of one sac of each anther.² But in certain of the Old World genera, and such New World allies as *Afzelia* (*Seymeria*) and *Silvia* this does not occur. Moreover absence of reduction is again purely a negative character. *Otophylla* is reducing its anthers by another process, also worthy of recognition.

(C) Absence of bractlets on pedicel. Again a negative character; of value in distinguishing from many Old World, but not from New World allies.

(D) There is but one other point occurring to me, the only feature

¹ *E. g.* our common *A. tenuifolia* (Vahl) Raf.

² There is an American species, wrongly heretofore held in "Gerardia," which shows this well, *Gerardia hispidula* Mart. This possesses other points of distinction, including bluish corollas and bractlets on pedicel.

which is positive, the fact that the two plate-like lobes of the stigma have fused, leaving as stigmatic areas only the lines of fusion on either side. But this condition is true, and also stages of evolution toward it are shown, in others of this tribe. There is a southwestern species which we have long been assured is a "Gerardia," *G. Wrightii* A. Gray, in which the stigma is capitate. Having correlated characters, I consider the last a monotypic genus. To be required to retain it in an aggregate *Agalinis* would certainly make all definition that defines hopeless.

If we accept as distinct genera *Aureolaria* and *Agalinis* we have for each excellent correlations of mostly positive characters; of habit, leaf, corolla-color, anther-awning (with one exception), capsule-shape and (of two types in *Aureolaria*) of seed. Moreover with one exception, the specific range of parasitism is quite different. If we unite these, or place others with them, and then seek to limit our aggregate genus, we find our problem difficult and any result unsatisfactory. Of course genera can be built upon single characters, but the purpose of genera is the expression of kinship, not the arbitrary division of the field of nature into categories of classification.

Pardon so long a discussion. But I feel that misunderstanding frequently exists, because we can not or do not make our comparisons sufficiently broad. Frequently the cry is raised, and too often with justification, against the splitting of old genera into segregates — these apparently distinct for the area under consideration but well-merged by intermediate species elsewhere. More rarely, or at least less protested, is the opposite case, the joining of natural groups into aggregates which beyond the home-area are ill-defined or not definable. I hope that this paper has presented clearly enough one such case, and that for the future we can all agree in the use of the names *Aureolaria* and *Otophylla*.

NEW YORK BOTANICAL GARDEN.